

Claims

- [1] A metal-insulator transition switching transistor, comprising:
a silicon substrate;
a gate electrode on the substrate;
a gate insulation film on the gate electrode and the silicon substrate;
a metal-insulator-transition channel layer on the gate insulation film, wherein the metal-insulator-transition channel layer changes from an insulator phase to a metal phase, or vice versa, depending on a variation of an electric field; and
a source and a drain being contacted with both sides of the metal-insulator-transition channel layer, respectively.
- [2] The metal-insulator-transition switching transistor as claimed in Claim 1, wherein the substrate is a silicon substrate.
- [3] The metal-insulator-transition switching transistor as claimed in Claim 1, wherein the source and the drain is a double layer constituted by materials selected from the group consisting of either a chrome (Cr) layer and a gold (Au) layer or a tungsten (W) layer and a titanium (Ti) layer.
- [4] The metal-insulator-transition switching transistor as claimed in Claim 1, wherein the metal-insulator-transition channel layer is composed of a vanadium dioxide (VO_2) thin film.
- [5] A method for manufacturing a metal-insulator-transition switching transistor, comprising the steps of
forming a gate electrode on a silicon substrate;
forming a gate insulation film on the silicon substrate and the gate;
forming a source electrode and a drain electrode on the gate insulation film; and
forming a metal-insulator-transition channel layer between the source and the drain electrodes.
- [6] The method for manufacturing a metal-insulator transition switching transistor as claimed in Claim 5, wherein the source and the drain is a double layer constituted by materials selected from the group consisting of either a chrome (Cr) layer and a gold (Au) layer or a tungsten (W) layer and a titanium (Ti) layer.
- [7] The method for manufacturing a metal-insulator-transition switching transistor as claimed in Claim 5, wherein the step of forming the source and the drain is performed by using a lift-off process.
- [8] The method for manufacturing a metal-insulator-transition switching transistor

as claimed in Claim 5, wherein the metal-insulator-transition channel layer is formed using a vanadium dioxide (VO_2) thin film.

- [9] The method for manufacturing a metal-insulator-transition switching transistor as claimed in Claim 8, the VO_2 thin film is grown at a growth temperature in the range of 450°C to 470°C and with an oxygen flow variation in the range of 5 to 6 SCCM.